APPENDIX V: Valve Placement, Orientation and Location

Issue ID #: 246
Pic: 0436x

Compartment Name/Number/Type/Equipment(s):

MMR #1/Machinery Spaces/Valve

Issue(s)/Hazard(s) Description:

Valves should either operate up from centerline or down from centerline, but not up to the centerline.

Potential Mishap (Risk):

- Risk of potential incorrect operation and/or delay in operation.
- Risk of striking hazard as the lever pointing down as shown becomes a hazard.

Reference Criteria:

- ASTM F1166 - 2007, Section 12.4.
- *ABS Guidance Notes for the Application of Ergonomics to Marine Systems,* Section 7.4.2.

Recommendation(s):

Reorient valve so that the lever will rest in the horizontal position (at the centerline) and operate either moving up or down from horizontal.

APPENDIX V: Valve Placement, Orientation and Location

Issue ID #: 247
Pic: 0437x

Compartment Name/Number/Type/Equipment(s):

MMR #1/Machinery Spaces/Valve

Issue(s)/Hazard(s) Description:

1. These vertical stem valves should not have the stem pointing down.
2. These valves should be located between 30" and 50" above the deck.

Potential Mishap (Risk):

- Increased maintenance requirements.
- Risk of injury to personnel – Awkward postures and strain while operating valve due to configuration.

Reference Criteria:

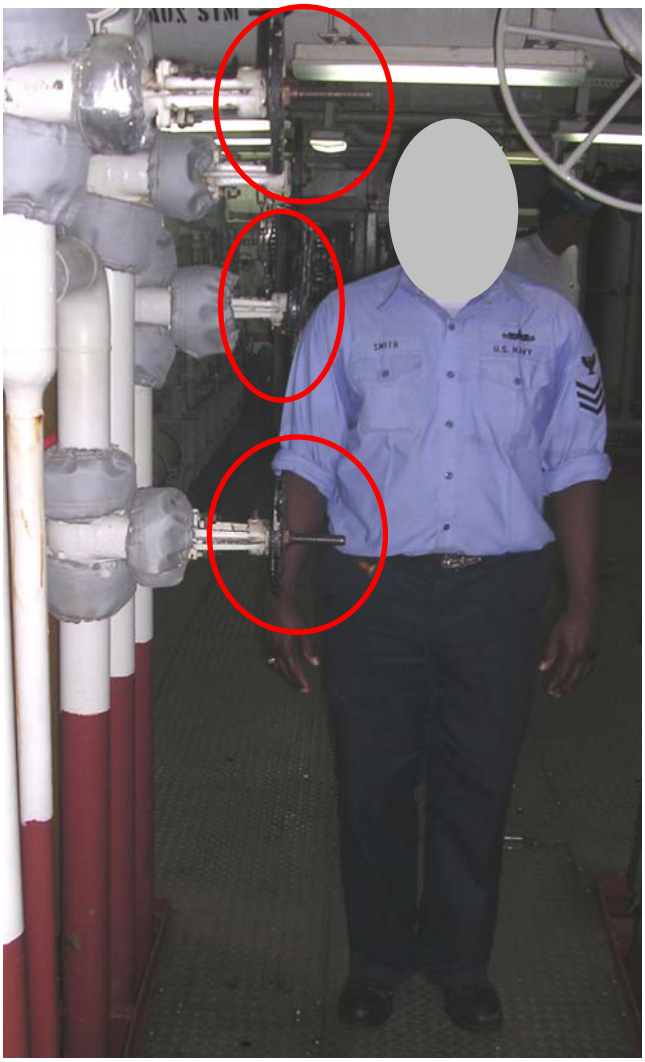
- ASTM F1166 - 2007, Section 12.3.
- *ABS Guidance Notes for the Application of Ergonomics to Marine Systems,* Section 7.4.1.

Recommendation(s):

1. Reorient valve to stand stem up or turn horizontally.
2. Relocate valve to an appropriate height based upon it's orientation in accordance with the standards above as well as the criticality assessment: frequency or use and criticality during emergency situations.

APPENDIX V: Valve Placement, Orientation and Location

Issue ID #: 248
Pic: 0105x



Compartment Name/Number/Type/Equipment(s):
Auxiliary Machinery Room/Machinery Spaces/Valve

Issue(s)/Hazard(s) Description:
Horizontal stems of valves protrude into this normal walking area at eye and waist level.

Potential Mishap (Risk):
Risk of injury to personnel (running in to obstruction).

Reference Criteria:

- ASTM F1166 – 2007, Section 12.5.
- *ABS Guidance Notes for the Application of Ergonomics to Marine Systems,* Section 7.2.1.

Recommendation(s):
Relocate valves such that they don't protrude into passageway.

APPENDIX V: Valve Placement, Orientation and Location

Issue ID #: 249
Pic: 0418x

Compartment Name/Number/Type/Equipment(s):
MMR #1/Machinery Spaces/Valve Handwheel

Issue(s)/Hazard(s) Description:
This valve handwheel is located in the middle of the walkway just inches above grating providing a tripping hazard.

Potential Mishap (Risk):
Risk of injury to personnel (trip).

Reference Criteria:
ASTM F1166 – 2007, Section 12.5.2.

Recommendation(s):
Relocate valve handwheel such that it doesn't protrude in to the middle of the passageway, especially just inches off the grating.

APPENDIX V: Valve Placement, Orientation and Location

Issue ID #: 250
Pic: 0402x

Compartment Name/Number/Type/Equipment(s):

MMR #1/Machinery Spaces/Valve Handwheel

Issue(s)/Hazard(s) Description:

1. Valve handwheel protrudes into passageway.
2. The height of the handwheel above deck exceeds the optimal limit for valve operation.

Potential Mishap (Risk):

- Risk of injury to personnel (running in to obstruction).
- Risk of failure to operate valve (personnel injury and/or equipment damage).

Reference Criteria:

- ASTM F1166 – 2007, Section 12.5.
- *ABS Guidance Notes for the Application of Ergonomics to Marine Systems,* Section 7.2.1.

Recommendation(s):

1. Relocate valve handwheel such that it doesn't protrude into passageway.
2. Relocate valve handwheel within human performance envelope which is lower than currently positioned, less than 72” off the deck surface.

APPENDIX V: Valve Placement, Orientation and Location

Issue ID #: 251
Pic: 0403x

Compartment Name/Number/Type/Equipment(s):

MMR #1/Machinery Spaces/Valve Handwheel

Issue(s)/Hazard(s) Description:

1. Valve handwheel protrudes into passageway.
2. Obstructions in front of wheel may impede valve operation.

Potential Mishap (Risk):

- Risk of injury to personnel (running in to obstruction).
- Risk failure to operate valve (personnel injury and/or equipment damage).

Reference Criteria:

- ASTM F1166 – 2007, Section 12.5.
- *ABS Guidance Notes for the Application of Ergonomics to Marine Systems,* Section 7.2.1.

Recommendation(s):

1. Relocate valve handwheel such that it doesn't protrude into passageway.
2. Ensure valve handwheel is free of obstruction for operation with two hands (due to size). There should be at least 3" of clearance around the handwheel and room in front for personnel to stand, 24" minimum between the handwheel and the next closest obstruction (wall).

APPENDIX V: Valve Placement, Orientation and Location

Issue ID #: 252
Pic: 0420x

Compartment Name/Number/Type/Equipment(s):

FWD Main Machinery/Machinery Spaces/Valve

Issue(s)/Hazard(s) Description:

The valve is installed upside down and therefore steam/water leaks, getting into the workings of the valve, significantly increasing the rust and corrosion and ultimately accelerating need for replacement.

Potential Mishap (Risk):

Increased maintenance requirements - valve replacement.

Reference Criteria:

- ASTM F1166 - 2007, Section 12.3.
- *ABS Guidance Notes for the Application of Ergonomics to Marine Systems,* Section 7.4.1.

Recommendation(s):

Re-orient the valve to eliminate this maintenance requirement to a location that allows the stem to be horizontal or stem pointing up without interfering with physical accessibility and maintaining a safe posture to operate by personnel (handwheel located approximately at waist height).

APPENDIX V: Valve Placement, Orientation and Location

Issue ID #: 253
Pic: 0129x

Compartment Name/Number/Type/Equipment(s):

FWD Main Machinery/Machinery Spaces/Valve

Issue(s)/Hazard(s) Description:

Difficult to access valve beneath grating for operation/maintenance.

Potential Mishap (Risk):

- Risk of delay in taking appropriate action (easy access to shutoff valve).
- Risk of injury to personnel (awkward postures, slip/trip exposure to hot surfaces).
- Increased maintenance requirements (poor maintenance performance - increased task complexity, task duration).

Reference Criteria:

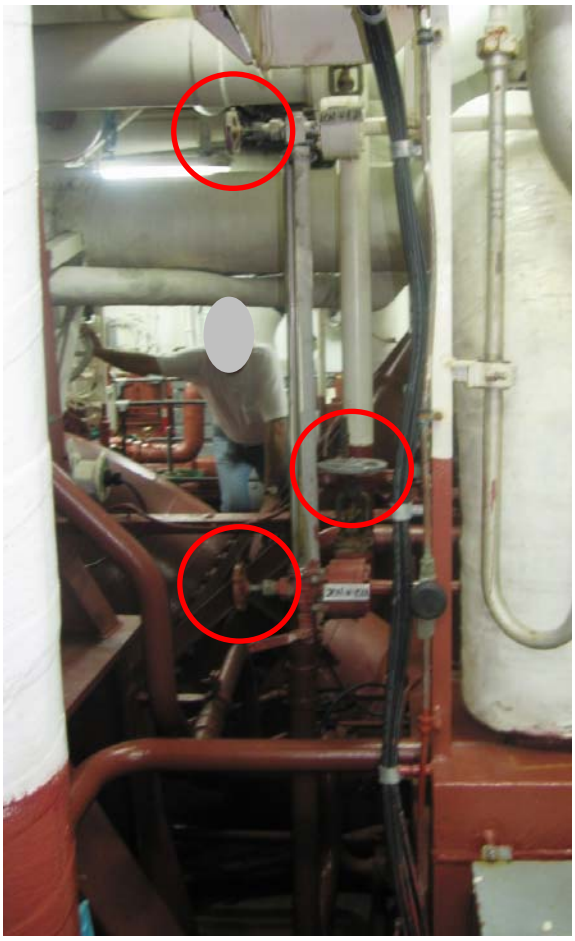
- ASTM F1166 - 2007, Section 12.1.
- *ABS Guidance Notes for the Application of Ergonomics to Marine Systems,* Section 7.2.

Recommendation(s):

Relocate valve to a location more easily accessible by personnel, especially if the valve is required to be operated during emergency situations or with any great frequency which should be determined by a valve criticality assessment.

APPENDIX V: Valve Placement, Orientation and Location

Issue ID #: 254
Pic: 0124x



Compartment Name/Number/Type/Equipment(s):

FWD Main Machinery/Machinery Spaces/Valves

Issue(s)/Hazard(s) Description:

Valve access for operation and/or maintenance will require personnel to crawl from a standing surface on to pipes, structural members and other non-standing surfaces. It is both extremely unsafe and time consuming to rely on this type of accessibility for valves.

Potential Mishap (Risk):

- Risk of delay in taking appropriate action (easy access to shutoff valve).
- Risk of injury to personnel (awkward postures, slip/trip exposure to hot surfaces).
- Increased maintenance requirements (poor maintenance performance - increased task complexity, task duration).

Reference Criteria:

- ASTM F1166 - 2007, Section 12.1.
- *ABS Guidance Notes for the Application of Ergonomics to Marine Systems,* Section 7.2.

Recommendation(s):

Relocate valve to a location more easily accessible by personnel, especially if the valve is required to be operated during emergency situations or with any great frequency which should be determined by a valve criticality assessment.

APPENDIX V: Valve Placement, Orientation and Location

Issue ID #: 255
Pic: 1318x

Compartment Name/Number/Type/Equipment(s):

Auxiliary Machinery Space/Machinery Spaces/Valve

Issue(s)/Hazard(s) Description:

1. Location and position of valve requires the operator to reach overhead in order to operate. 95th percentile males and smaller would not be able to reach the valve at all without a raised standing surface.
2. The fact that the valve is parallel with the deck makes it more difficult to operate even if the user was able to reach the valve.

Potential Mishap (Risk):

- Risk of improper operation of valve (leading to injury, equipment damage, or inadequate task performance).
- Risk of delay in taking appropriate action (ease of access to valve) - Risk is increased if valve is required for critical operations especially in emergency situations.
- Risk of injury to personnel (fall - if standing on a stepladder or temporary platform is required for operation).
- Increased difficulty in task performance (overhead valves parallel with the standing surface are undesirable as the posture required creates the least amount of torque as opposed to those mounted perpendicular to the deck).

Reference Criteria:

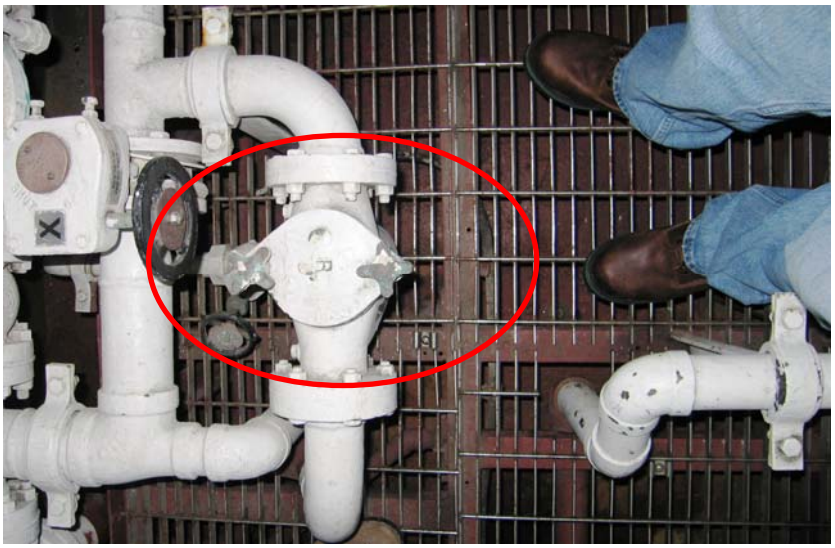
- ASTM F1166 - 2007, Section 12.3.
- *ABS Guidance Notes for the Application of Ergonomics to Marine Systems,* Section 7.4.1.

Recommendation(s):

1. Relocate the valve to a lower position, preferably between 18” and 51" above the deck.
2. Alternately, if the valve cannot be lowered to this degree, orienting the valve stem horizontally will only require lowering it to at least 72” off the deck.

APPENDIX V: Valve Placement, Orientation and Location

Issue ID #: 256
Pic: 1324x



Compartment Name/Number/Type/Equipment(s):

Auxiliary Machinery Space/Machinery Spaces/Valve Cover Plate

Issue(s)/Hazard(s) Description:

The location and the design of the piping located below an overhead valve encourage personnel to stand on it in order to get closer to the overhead valve for operation.

Potential Mishap (Risk):

- Risk of injury to personnel (slip/fall) - Using a pipe as a standing surface is extremely dangerous as it provides little room for standing and no traction.
- Increased risk of damage to equipment (damage to the piping due to repeated instances of personnel standing on it).

Reference Criteria:

- ASTM F1166 - 2007, Section 12.1.1.
- *ABS Guidance Notes for the Application of Ergonomics to Marine Systems,* Section 7.2.1.

Recommendation(s):

1. Change the piping layout so as not to encourage unsafe behavior of personnel by standing on equipment to access valves.
2. Add a small platform so as to provide a safe standing surface.

APPENDIX V: Valve Placement, Orientation and Location

Issue ID #: 257
Pic: 1336x

Compartment Name/Number/Type/Equipment(s):

Auxiliary Machinery Space/Machinery Spaces/Valves

Issue(s)/Hazard(s) Description:

1. The small one-handed valve below the grating is difficult to access.
2. The second valve, located below the first is even more difficult to access due to the location of the one above.

Potential Mishap (Risk):

- Risk of improper operation of valve (leading to injury, equipment damage, or inadequate task performance).
- Risk of delay in taking appropriate action (ease of access to valve) - Risk is increased if valve is required for critical operations especially in emergency situations.
- Increased maintenance task complexity (due to access).
- Risk of injury to personnel (hands, awkward posture).

Reference Criteria:

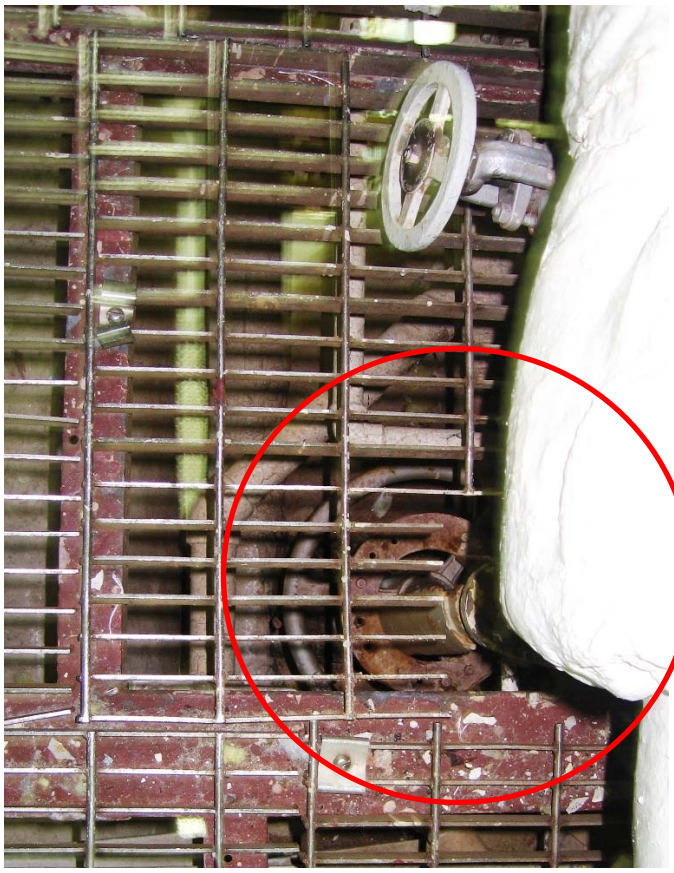
- ASTM F1166 - 2007, Section 12.1.2 and 12.5.4.
- *ABS Guidance Notes for the Application of Ergonomics to Marine Systems,* Sections 7.2.1 and 7.5.4.

Recommendation(s):

1. Cut back grating in order to access the front of valve handwheels.
2. Valves that are required to be used in emergency situations (determined by a valve criticality assessment) should not be located below the grating.
3. Provide at least 3" of clearance on all sides of handwheel.
4. Offset or configure valves side to side to ease access.

APPENDIX V: Valve Placement, Orientation and Location

Issue ID #: 258
Pic: 0116x



Compartment Name/Number/Type/Equipment(s):

FWD Main Machinery Space/Machinery Spaces/Valve

Issue(s)/Hazard(s) Description:

Valve located under grating is difficult to access.

Potential Mishap (Risk):

- Risk of improper operation of valve (leading to injury, equipment damage, or inadequate task performance).
- Risk of delay in taking appropriate action (ease of access to valve) - Risk is increased if valve is required for critical operations especially in emergency situations.
- Increased maintenance task complexity (due to access).
- Risk of injury to personnel (hands, awkward posture).

Reference Criteria:

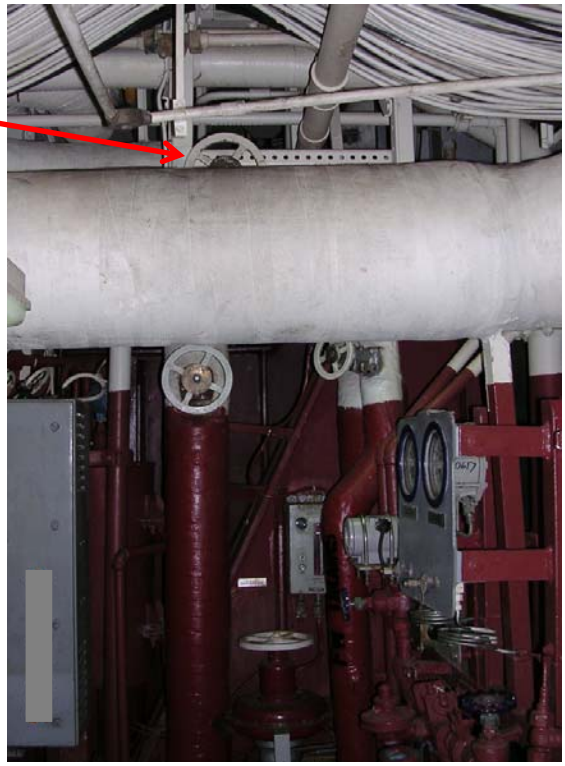
- ASTM F1166 - 2007, Section 12.1.2 and 12.5.4.
- *ABS Guidance Notes for the Application of Ergonomics to Marine Systems,* Sections 7.2.1 and 7.5.4.

Recommendation(s):

1. Cut back grating in order to access the front of valve handwheels.
2. Valves that are required to be used in emergency situations (determined by a valve criticality assessment) should not be located below the grating.
3. Provide at least 3" of clearance on all sides of handwheel.

APPENDIX V: Valve Placement, Orientation and Location

Issue ID #: 259
Pics: 0421x, 0422x



Compartment Name/Number/Type/Equipment(s):

MMR #1/Machinery Spaces/Valve Handwheel

Issue(s)/Hazard(s) Description:

Location and position of valve handwheel requires the operator to step on a structure not intended for standing and reach over a pipe that may be hot.

Potential Mishap (Risk):

- Risk of improper operation of valve (leading to injury, equipment damage, or inadequate task performance).
- Risk of delay in taking appropriate action (ease of access to valve) - Risk is increased if valve is required for critical operations especially in emergency situations.
- Increased maintenance task complexity (due to access).
- Risk of injury to personnel (fall, awkward posture, exposure to hot surfaces).

Reference Criteria:

- ASTM F1166 - 2007, Section 12.1.1.
- *ABS Guidance Notes for the Application of Ergonomics to Marine Systems,* Section 7.2.1.

Recommendation(s):

1. Change the piping layout to lower the valve handwheel location so as not to encourage unsafe behavior of personnel by standing on equipment to access valves.
2. Add a small platform so as to provide a safe standing surface, if necessary.

APPENDIX V: Valve Placement, Orientation and Location

Issue ID #: 260
Pic: 1305x

Compartment Name/Number/Type/Equipment(s):

Pulper Room/Machinery Spaces/Valve

Issue(s)/Hazard(s) Description:

- Location and position of valve (81" above the deck) requires the operator to reach overhead in order to operate. 25th percentile males and smaller would not be able to reach the valve at all without a raised standing surface.
- The fact that the valve is parallel with the deck makes it more difficult to operate even if the user was able to reach the valve.

Potential Mishap (Risk):

- Risk of improper operation of valve (leading to injury, equipment damage, or inadequate task performance).
- Risk of delay in taking appropriate action (ease of access to valve) - Risk is increased if valve is required for critical operations especially in emergency situations.
- Risk of injury to personnel (fall - if standing on a stepladder or temporary platform is required for operation)
- Increased difficulty in task performance (overhead valves parallel with the standing surface are undesirable as the posture required creates the least amount of torque as opposed to those mounted perpendicular to the deck).

Reference Criteria:

- ASTM F1166 - 2007, Section 12.3.
- *ABS Guidance Notes for the Application of Ergonomics to Marine Systems,* Section 7.4.1.

Recommendation(s):

1. Relocate the valve to a lower position, preferably below 51” above the deck.
2. If this is not possible, change to orientation of the handwheel to a horizontal stem and lower to less than 72” off the standing surface.

APPENDIX V: Valve Placement, Orientation and Location

Issue ID #: 261
Pic: 1306x

Compartment Name/Number/Type/Equipment(s):

Passageway/Machinery Spaces/Valve

Issue(s)/Hazard(s) Description:

Location and position of valve (90" above the deck) requires the operator to reach overhead in order to operate. 95th percentile males and smaller would not be able to reach the valve at all without a raised standing surface.

Potential Mishap (Risk):

- Risk of improper operation of valve (leading to injury, equipment damage, or inadequate task performance).
- Risk of delay in taking appropriate action (ease of access to valve) - Risk is increased if valve is required for critical operations especially in emergency situations.
- Risk of injury to personnel (fall - if standing on a stepladder or temporary platform is required for operation).

Reference Criteria:

- ASTM F1166 - 2007, Section 12.3.
- *ABS Guidance Notes for the Application of Ergonomics to Marine Systems,* Section 7.4.1.

Recommendation(s):

Relocate the valve to a lower position, preferably 72” off the deck or lower. This is a requirement for those valves that are required to be operated frequently or during emergency situations which would be determined by a valve criticality study.

APPENDIX V: Valve Placement, Orientation and Location

Issue ID #: 262
Pic: 1328x

Compartment Name/Number/Type/Equipment(s):

Auxiliary Machinery Space/Machinery Spaces/Valve

Issue(s)/Hazard(s) Description:

Access to the valve wheel (which requires two hands as it is over 6" in diameter) is located behind piping over 2' laterally from the standing location.

Potential Mishap (Risk):

- Risk of improper operation of valve (leading to injury, equipment damage, or inadequate task performance).
- Risk of delay in taking appropriate action (ease of access to valve) - Risk is increased if valve is required for critical operations especially in emergency situations.
- Risk of injury to personnel (awkward postures - personnel would have to climb in and over piping to operate).
- Increased difficulty in task performance (valve is mounted parallel with the standing surface, the position required to operate it produces less torque than if it were perpendicular with the deck).

Reference Criteria:

- ASTM F1166 - 2007, Section 12.3.
- *ABS Guidance Notes for the Application of Ergonomics to Marine Systems,* Section 7.4.1.

Recommendation(s):

1. Relocate the valve closer to the standing surface within 19 1/4" in order to meet the reach requirements of a 5th percentile female.
2. Also rotate the valve so that the wheel is perpendicular with the deck.

APPENDIX V: Valve Placement, Orientation and Location

Issue ID #: 263
Pics: 0431x, 0432x

Compartment Name/Number/Type/Equipment(s):

MMR #1/Machinery Spaces/Valve Handwheel

Issue(s)/Hazard(s) Description:

View shows the posture required in order to access a shut off valve. Note: The operation of a valve should never require standing on or grabbing a pipe or structure not meant for standing/grabbing.

Potential Mishap (Risk):

- Risk of improper operation of valve (leading to injury, equipment damage, or inadequate task performance).
- Risk of delay in taking appropriate action (ease of access to valve) - Risk is increased if valve is required for critical operations especially in emergency situations.
- Risk of injury to personnel (fall - if standing on a stepladder or temporary platform is required for operation).

Reference Criteria:

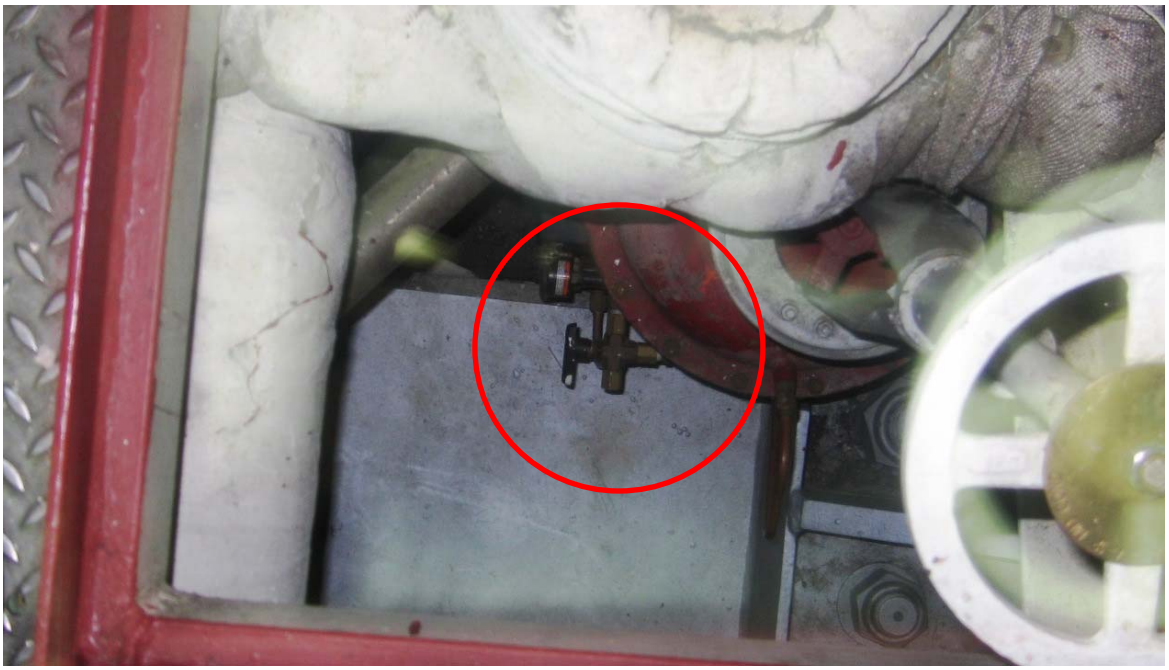
- ASTM F1166 - 2007, Section 12.3.
- *ABS Guidance Notes for the Application of Ergonomics to Marine Systems,* Section 7.4.1.

Recommendation(s):

Relocate the valve to a lower position, preferably 72" off the deck or lower. This is a requirement for those valves that are required to be operated frequently or during emergency situations which would be determined by a valve criticality study.

APPENDIX V: Valve Placement, Orientation and Location

Issue ID #: 264
Pic: 0123x



Compartment Name/Number/Type/Equipment(s):

FWD Main Machinery /Machinery Spaces/Valve

Issue(s)/Hazard(s) Description:

This small, one-handed valve below the deck level is difficult to access due to its adjacent obstructions one would contact while reaching down and depth below the grating.

Potential Mishap (Risk):

- Risk of improper operation of valve (leading to injury, equipment damage, or inadequate task performance).
- Risk of delay in taking appropriate action (ease of access to valve) - Risk is increased if valve is required for critical operations especially in emergency situations.
- Increased maintenance task complexity (due to access).
- Risk of injury to personnel (hands, awkward posture).

Reference Criteria:

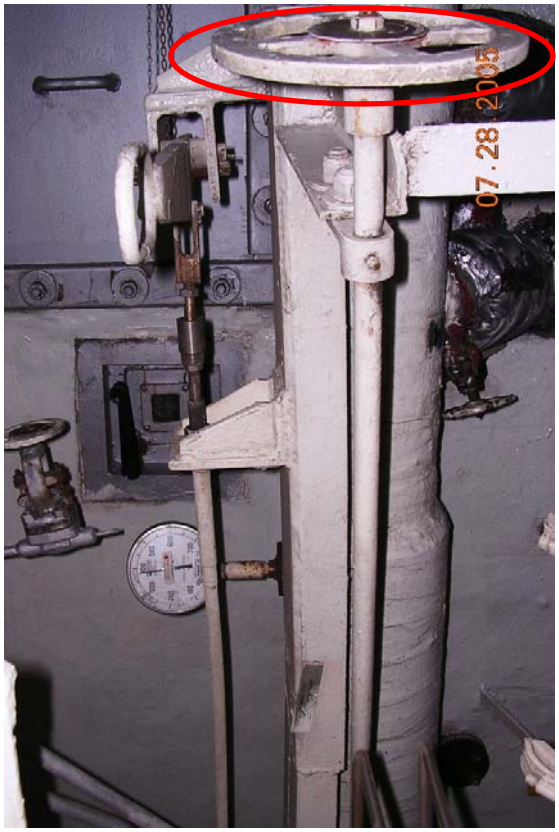
- ASTM F1166 - 2007, Section 12.1.2 and 12.5.5.
- *ABS Guidance Notes for the Application of Ergonomics to Marine Systems,* Sections 7.2.1 and 7.5.4.

Recommendation(s):

1. Provide at least 3" of clearance on all sides of the valve.
2. Mount the valve handwheel no more than 24” below the standing surface.
3. Valves that are required to be used in emergency situations (determined by a valve criticality assessment) should not be located below the grating.

APPENDIX V: Valve Placement, Orientation and Location

Issue ID #: 265
Pic: 0411x



Compartment Name/Number/Type/Equipment(s):

MMR #1/Machinery Spaces/Valve Handwheel

Issue(s)/Hazard(s) Description:

1. The vertical stem handwheel is above the level for normal operation by personnel from the top.
2. The gauge display is oriented more than 90 degrees from upright which makes it difficult to read accurately.

Potential Mishap (Risk):

- Risk of improper operation of valve (leading to injury, equipment damage, or inadequate task performance).
- Risk of delay in taking appropriate action (ease of access to valve) - Risk is increased if valve is required for critical operations especially in emergency situations.
- Increased maintenance task complexity (due to access).
- Risk of injury to personnel (hands, awkward posture).

Reference Criteria:

ASTM F1166 – 2007, Sections 6.2.4 and 10.3.2.

Recommendation(s):

1. Relocate valve handwheel to an appropriate height for operation from the top, which should be below 51” off the standing surface.
2. Rotate the gauge 90 degrees in order to be read upright.